ALS MEDICATION REFERENCES

ACTIVATED CHARCOAL- Adsorbent - Adsorbs toxic substances ingested into the gastrointestinal tract thus inhibiting any gastrointestinal adsorption.
Side effects: Will color stools black although medically insignificant. Be aware of possible aspiration.
Typical Preparations: 12.5, 25 or 50gm size squeeze bottles. Some preparations contain sorbitol.
Dose: Adult: 50gms PO
Pediatric: 1gm/kg PO

ADENOSINE - Naturally occurring nucleotide present in all cells of the body- Slows conduction through the AV node and dilates coronary arteries and peripheral vessels. Adenosine has a half-life of 10 to 12 seconds and is rapidly metabolized by blood and tissues to Inosine, a crystalline nucleotide. Used as the drug of choice in treating episodes of Narrow Complex Tachycardias. May also be considered for Stable V-Tach or Wide Complex Tachycardias.
Side Effects: Transient, lasting less than a minute, and may include chest pain, shortness of breath, flushing and various dysrhythmias including transient Asystole or V-Fib. Adenosine is often referred to as a "chemical cardioversion" Give with caution to patients with an asthma history, because of a potential for bronchospasm.
Typical Preparations: 6mg/1ml vials
Dose: Adult: 6mg rapid IV bolus to IV port closest to the patient, followed immediately by a rapid IV bolus of 20ml NS. If there is no change in rhythm within 2 minutes, give a 12mg rapid IV bolus followed as before with a rapid IV bolus of 20ml NS. May give a 3rd bolus of 12mg if there is no change in rhythm.

ALBUTEROL SULFATE - Bronchodilator- A $Beta_2$-adrenergic receptor stimulant that will affect the respiratory tract in the form of bronchial smooth muscle relaxation. Used as a bronchodilator for reversible, acute bronchospasms in patients with bronchitis, emphysema and asthma.
Side Effects: May cause palpations, hypertension, anxiety, nausea and dizziness. Always monitor vitals and use with caution for patients with a history of cardiovascular disease or hypertension.
Note: Other sympathomimetic aerosol bronchodilators or Epinephrine should not be used concomitantly with Albuterol. Beta blocking agents and Albuterol inhibit the effect of each other.

Typical Preparations: Premixed unit dose of 2.5mg in 2.5ml NS
Dose: Adult: Use 2.5mg of Albuterol solution in small volume nebulizer over 5-15 minutes.
Pediatric: Same as adult dose.

ASPIRIN - Antiplatlet- Indicated for any patient experiencing symptoms associated with myocardial infarction or transient ischemic episode.
Side Effects- Aspirin may cause nausea, vomiting or hemorrhage as well as exacerbate pain in patients with a history of GI irritation. Aspirin should not be given to any patient with a history of GI hemorrhage, intracranial hemorrhage, major surgery within the last 1-2 weeks, history of aortic aneurysm, or previous thrombosis.
Typical Preparations- Bottle of 81mg chewable tablets
Dose: Adult: 162mg (two 81mg chewable tablets)
Pediatric: Not recommended in the pre-hospital setting

ATROPINE SULFATE- Parasympathetic agent- Atropine Inhibits the effects of parasympathetic nervous system by blocking acetylcholine receptors. It increases the heart rate in certain bradycardias. In addition, Atropine is also used in the treatment of organophosphate and nerve agent poisonings.
Side Effects - The effects of Atropine are short acting. Consider TCP instead of Atropine for a documented MI, 3rd degree wide complex AV block, and 2nd degree type II AV block
Typical Preparations - 1mg/10ml preload syringe
Dose: Adult: Bradycardia: 0.5mg IV push to max of 3mg or 0.04mg/kg.
PEA, Asystole: 1mg IV push to max of 3mg or 0.04mg/kg.
Organophosphate/Nerve Agent Poisoning: 2mg IV push may repeat if patient remains symptomatic
Pediatric: Cardiac Emergencies: Not indicated for pediatric patients
Organophosphate Poisoning: 0.02mg/kg IV/IO, minimum dose 0.1mg

CALCIUM CHLORIDE- Cardiotonic agent- Calcium Chloride is an electrolyte necessary for myocardial contractions, increases myocardial contractile force, and may also enhance ventricular excitability. The calcium ion is essential for coupling the electrical event with mechanical contraction. Medication is used primarily for acute hyperkalemia, acute hypocalcemia, calcium channel blocker toxicity (Nifedipine, Verapamil, etc.)
Side Effects- May produce severe bradycardia, arrhythmias, cardiac arrest or syncope. Will precipitate if mixed with Sodium Bicarbonate, flush IV tubing prior to and after administration. If IV site becomes infiltrated, necrosis may occur around insertion site. May precipitate Digitalis toxicity
Typical Preparations- 10cc Calcium Chloride (1Gm/10ml) preload syringe
Dose: Adult: 8-16mg/kg (5-10ml) Base Hospital Order only

DEXTROSE 25% & 50%- Solutions of glucose in water- An immediate source of glucose which may be rapidly utilized for cellular metabolism. May consider in cases of altered mental status, consider in comas of unknown etiology, including unwitnessed cardiac arrest, and seizures of unknown etiology.
Side Effects- this solution is very neurotoxic should it extravasate into tissue. Aspirate frequently to insure blood return.
Note-A blood glucose should be obtained prior to and 20 minutes after administration of Dextrose.
Typical Preparations- 25Gm (50%) in 50ml and 2.5gm (25%) in 10ml
Dose: Adult: 50ml rapid IV/IO push. May repeat after re-checking blood sugar.
Pediatric: 0.5gm/kg of 50% Dextrose IV/IO, dilute with equal amount NS or 25% Dextrose
Infants: 0.5gm/kg of 25% Dextrose IV/IO

DIPHENHYDRAMINE- Antihistamine- Administered after Epinephrine in the treatment of anaphylaxis, used to inhibit histamine release in allergic reactions. Histamine release causes capillary dilation and increased capillary permeability, both of which lead to edema formation. Benadryl is also useful in the treatment of extrapyramidal reactions. Will cause marked improvement, if not total resolution of those symptoms.
Side Effects- Drowsiness, dizziness, sedation, disturbed coordination. Dry mouth, may aggravate glaucoma, and cause urinary retention. Alcohol, narcotics, CNS depressants or other antihistamines may enhance the sedative effects of Benadryl.
Typical Preparations- 1cc (50mg/1ml) ampule or vial
Dose: Adult: 50mg IM or 25mg IV slowly
Pediatric: 2mg/kg IM or 1mg/kg IV slowly

DOPAMINE- Sympathetic agonist- A naturally occurring catecholamine and a chemical precursor of norepinephrine. It acts on alpha receptors, is dose dependent, causing peripheral vasoconstriction. The effect on beta 1 receptors causes a positive inotropic effect on the heart, without increasing myocardial oxygen demand as much as Epinephrine. Because of its effects on dopamine receptors when used in therapeutic doses, it maintains renal and mesenteric blood flow. Used in cardiogenic shock, or in patients with significant hypotension, when fluid replacement is unsuccessful. May also be useful in severe CHF or acute allergic reaction.
Side Effects- Increased heart rate. Can worsen or induce narrow complex and wide complex tachycardias. With narrow complex or wide complex tachycardias do not administer. Deactivated by alkaline solutions such as Sodium Bicarbonate. May cause hypotension in patients taking Dilantin.
Typical Preparations- 200mg/5ml: ampule or vial
Dose: Adult: 5-20mcg/kg/min. For the average adult 400mg of Dopamine in 250ml D5W at a rate of 30-60 microdrops/minute provides this dose range. Titrate to blood pressure and other signs of perfusion
Pediatric: **Contraindicated** in children under 8 years of age within the ICEMA region

EPINEPHRINE- Endogenous catecholamine- Epinephrine is an adrenergic agent with both alpha and beta receptor stimulating actions; effects include increased heart rate, contractility electrical activity, blood pressure, systemic vascular resistance and automaticity. Epinephrine initiates electrical activity in asystole and converts fine v-fib to course v-fib, thereby improving chances for successful defibrillation. In addition, it is a smooth muscle relaxant in severe reactive airway disease, and decreases bronchospasm in anaphylaxis.
Side Effects- Effects may be intensified in patients taking anti-depressants. All patients should be observed for tachy-arrhythmias. Epinephrine will precipitate if mixed with Sodium Bicarbonate.
Typical Preparations- 1ml 1:1,000 ampule, 10ml 1:10,000 syringe and 30ml 1:1000 multi-dose vial
Dose: Adult: Cardiac Arrest 1.0mg IV/ET/IO May repeat every 3-5 minutes. Maximum 3mg PTC
Pediatric: Cardiac Arrest: 1 Day to 8 Years of Age .01mg/kg IV/IO May repeat every 3 -5minutes at 0.01mg/kg Et dose is 10 times the IV dose, 0.1mg/kg diluted in 2-5ml NS, 3-5 minutes.
Post Resuscitative Care: 1 Day to 8 Years of Age: 0.005mg/kg (1:10,000) IV every 10 minutes for hypotension.
Cardiac Arrest: 9 to 15 Years of Age - Same as Adult dosage

EPINEPHRINE cont.

Adult: Acute Allergic Reaction and/or Bronchospasm: 0.3mg SC (1:1,000 solution) May repeat one time. Maximum total dosage 0.5mg for severe anaphylaxis

Pediatric: Acute Allergic Reaction and/or Bronchospasm: 0.01 mg/kg SC (1:1,000) up to 0.3mg SC Maximum total dosage 0.05 mg/kg for severe anaphylaxis

FUROSEMIDE- Diuretic- Lasix is a potent diuretic inhibiting sodium chloride re-absorption in the kidney. It also causes venous dilation. Used in the later stages of CHF and pulmonary edema to remove excess fluid. Use with extreme caution in patients who may have Pneumonia, as these patients may be dehydrated

Side Effects- Dehydration and electrolyte depletion, which may lead to digitalis and/or lithium toxicity, hypokalemia, hyponatremia, and hypoglycemia. Hypotension, EKG changes, and chest pain. Fetal abnormalities.

Typical Preparations- 10mg/ml vials.

Dose: Adult: 40-100mg IV or 2 times the daily dose. Maximum dose 100mg IV slowly. May only be given by Base Hospital order or in RCF

Pediatric: 1mg/kg IV slowly. Base Hospital Order only.

GLUCAGON- Pancreatic hormone- Elevates blood glucose level by causing a breakdown of glycogen stored in the liver to glucose. Also inhibits the synthesis of glycogen from glucose. Hypoglycemia when IV access is unobtainable. Administer with caution to patients with a history of cardiovascular or renal disease. Administer with caution to patients with history of possible esophageal foreign body aspiration

Side Effects- Nausea and vomiting. Hypersensitivity.

Typical Preparations: 1ml ampule containing 1mg Glucagon. Use only dilutent provided to make a 1mg/ml solution.

Dose: Adult: 1mg IM/SC. The onset of action is within 5 to 20 minutes. May also be given IV.

Pediatric: 0.025mg/kg, IM/SC. May repeat 1 time after 20 minutes, if the total of both doses does not exceed 1mg.

LIDOCAINE- Antidysrhythmic- With the changes recommended by AHA, there has been a change in how Lidocaine is used. For Unstable V-Tach or Wide Complex Tachycardias and VF/Pulseless VT it continues to be recommended. It suppresses the automaticity of ventricular ectopic pacemakers. During a myocardial infarction, Lidocaine elevates the ventricular fibrillation threshold. A Lidocaine bolus should be followed by a 2-4mg/min infusion to maintain therapeutic blood levels. Lidocaine is also effective when used at 1.5mg/kg as rapid IV bolus prior to intubation of a head injured patient. In this instance, it numbs the oropharynx for approx 1 minute, thereby decreasing the chance of increasing the ICP during intubation.

Side Effects- Contraindicated in 2nd degree Type II, and 3rd degree AV blocks. As it may further slow the conduction of the electrical impulse from the atria to the ventricles. Lidocaine should never be given in conjunction with premature ventricular contractions and bradycardic rhythms. In these cases the bradycardic rhythm should be treated first. CNS depression may occur at high doses. In addition, use decreased dosages for elderly patients and those with impaired liver and renal function. Symptoms of CNS depression may include: decreased level of consciousness, irritability, confusion, muscle-twitching, seizures, coma and finally, death.

Typical Preparations- 5ml preload syringes (100mg/5cc)
250ml NS with IGM Lidocaine premixed.

Dose: Adult: VF/Pulseless VT and unstable VT or Wide Complex Tach 1mg/kg slow IV push. Repeat at one half the initial dose every 5-10 minutes to a maximum of 3mg/kg
Maintenance dose: 1-4mg/min

Pediatric: Cardiac Arrest 1 Day to 8 Years of Age: 1.0mg/kg IV/IO.

Cardiac Arrest: 9 to 15 Years of Age - Same as Adult dosage

MAGNESIUM SULFATE- Magnesium supplement and anticonvulsant- One of the major cations and an essential element in numerous biochemical reactions in the body. Responsible for neurotransmission and muscular excitability. Low levels of magnesium may cause refractory ventricular fibrillation and impede the replenishment of intracellular potassium. Dysrhythmias associated with hypomagnesemia include: Torsade de points, refractory v-fib/v-tach, PEA and Asystole. It also acts as a peripheral vasodilator, and resolves seizures associated with toxemia of pregnancy (eclampsia).

Side Effects- May cause drowsiness, respiratory depression, hypotension and circulatory collapse. Use with caution in patients with decreased renal function, those undergoing dialysis, taking cardiac glycosides, history of hypocalcemia, and individuals in 3rd degree heart block. **NOTE-** An overdose of Magnesium may cause respiratory depression and heart block. A 10% Calcium Chloride bolus of 500mg-1gm should be given with Base Hospital order.

Typical Preparations- 10gm vial of a 10% solution

MAGNESIUM SULFATE Cont.
Dose: Adult: Seizure activity in the toxemic patient: 4gms IV/IO **slowly** diluted with 20 ml NS over 3-4 minutes
Maintenance dose: 2gms in 100ml NS at 30ml/hr
Stable VT/Wide Complex Tachycardias, PEA and Asystole: 2gm IV slowly over 3 minutes. Diluted with 20-30ml of NS
Pediatric: Not recommended in the pre-hospital setting

MIDAZOLAM- Sedative/ hypnotic – Midazolam is a short acting benzodiazepine with amnesic properties. In the pre-hospital setting, benzodiazepines are primarily used as skeletal muscle relaxants, for pre-procedure sedation, and for anticonvulsant activity. Benzodiazepines are absorbed from the GI tract and metabolized in the liver. Onset of action when administered IV is 1 to 5 minutes and less than 15 minutes when administered intramuscularly. Like other benzodiazepines, it has no effect on pain.
Side Effects – Can cause laryngospasm, bronchospasm, dyspnea, respiratory depression and arrest, bradycardia, tachycardia, PVCs and retching. Drug should not be given to patients with a history of narrow-angle glaucoma, in shock, depressed vital signs, in an alcoholic coma, or with known sensitivity to the drug, or allergies to cherries (for oral preparations only). ALWAYS monitor and document respirations when giving this drug
Typical Preparations- 2mg/2ml, 10mg/2ml and 5mg/5ml vials
Dose: Adult: Cardioversion and TCP: 1 to 2mg Slow IV push. May be given PTC to awake patients.
Seizures: 5-10mg IM or 2.5-5mg IV/IO
Pediatric: Seizures: 0.2mg/kg IM with maximum IM dose 10mg or 0.1mg/kg IV/IO, maximum IV/IO dose 2.5-5mg

MORPHINE SULFATE- Narcotic analgesic- a potent CNS depressant that reduces discomfort, apprehension and fear, in patients experiencing pain. It also has certain hemodynamic properties such as decreased systemic vascular resistance which can lead to decreased myocardial oxygen demands. Used for the severe pain associated with myocardial ischemia and/or myocardial infarct not relieved by Nitroglycerin. Used for severe pain associated with isolated extremity fractures.
Side Effects- Respiratory depression, hypotension. nausea & vomiting. Not recommended for use in the initial acute stages of CHF and PE because of the potential for respiratory compromise. Do no use in situations where the close monitoring of mental status is required (as in, head injury, multiple system trauma, hypovolemia, abdominal pain and chest trauma.) **Note-** Narcotic effects are reversible with Naloxone (Narcan.) Hypotensive effects are NOT reversible.
Typical Preparations- 1cc ampule (10mg/ml)
Dose: Adult: Suspected Acute MI: 2mg IV may repeat every 3 minutes to total 10mg
Adult Trauma: For Extremity Trauma and Suspected Hip Fracture 2mg increments up to 20mg. For burns 2-4mg increments titrated up to 30mg IV
Cold Related Emergencies: For frostbite, 2mg IV not to exceed 2mg increments to a total of 10mg or 10mg IM may repeat dosage one time for pain relief. In RCF may administer a repeat dose.
Pediatric: Pediatric Trauma: 0.1-0.2mg/kg IV not to exceed 2mg increments up to 5mg IV or 10mg IM in isolated extremity trauma or 20mg total for Burns
Cold Related Emergencies: For frostbite, 0.1mg/kg IV not to exceed 2mg increments to a total of 5mg or 0.2mg/kg IM to a total of 10mg IM titrated for pain relief. In RCF may administer a repeat dose.

NALOXONE- Narcotic antagonist- Reverses the effects of narcotics or synthetic narcotic agents by binding to central nervous system depressants. Examples of these agents are: Heroin, Methadone, Propoxyphene (Darvon), Pentazocine (Talwin), Meperidine, Morphine, Diphenoxylate (Lomotil), Codeine, Oxycodone (Percodan) and various diarrhea and cough medicines containing any of these medications.
Side Effects- In the absence of narcotics, Naloxone has no perceivable effects. Rapid reversal of narcotic overdose may lead to combative behavior. Use with caution in patients with pre-existing Cardiovascular disorders.
Typical Preparations- 2cc ampules (1mg/1ml.) 10cc Vial (4mg/10ml.) 1cc ampule/Vial (0.4mg/1ml)
Dose: Adult: 1.0-2.0mg IV, IM, or SC
Pediatric: 0.01mg/kg IV, or SC as initial dose.

NITROGLYCERINE- Smooth muscle relaxant- Rapid, direct vasodilation effect on both arterial and venous vessels causing venous pooling of blood. Also causes vasodilation of coronary arteries, thereby increasing perfusion of ischemic myocardium tissue. This action reduces myocardial work and oxygen consumption. Which leads to pain relief. In CHF and Pulmonary Edema, Nitroglycerine is used to decrease pre-load and after-load, thereby improving cardiac output. Nitroglycerin is contraindicated PTC for the patient taking Viagra and may only be given as a direct Base Hospital Physician order for these patients.
Side Effects- Hypotension. Headache. Flushing
Typical Preparations- Spray 0.4mg metered dose. Bottle 1/150gr = 0.4mg per tablet

NITROGLYCERINE Cont.

Dose: Adult: Suspected Acute MI: 1 metered dose sprayed onto the tongue (TL), or 1 tablet sublingually (SL). May repeat in 3minute intervals if signs/symptoms of adequate perfusion are present. Consider Morphine Sulfate for pain management when NTG is contraindicated (signs of inadequate tissue perfusion or recent use of sexual enhancement medications)
CHF/Pulmonary Edema: May repeat with signs/symptoms of adequate perfusion

Pediatric: Not used in children

OXYTOCIN- Hormone secreted by posterior pituitary- Causes the contraction of uterine smooth muscle and plays a role in lactation. It is effective in the pre-hospital treatment of postpartum hemorrhage by inducing uterine contractions. Before administration it is important to verify that the placenta has been delivered and there is not an additional fetus present.

Side Effects: Hypertension, cardiac dysrhythmias, and anaphylaxis have been reported as potential side effects. Therefore, it is important to monitor vital signs including BP, cardiac monitor, respiratory status and uterine tone. In addition, Oxytocin in excessive doses can cause uterine rupture. **NOTE:** Oxytocin is an optional ALS medication used during inter-facility transfers.

Typical Preparations- 10 units/1ml ampule

Dose: Adult: Inter-Facility Transport: 10-20 units in 1000ml NS. Titrate to sustain uterine contractions

PHENYLEPHRINE HYDROCHLORIDE- Direct-acting adrenergic agent, vasopressor- A synthetic sympathomimetic compound structurally similar to Epinephrine and Ephedrine. Used topically it acts locally as a potent vasoconstrictor which may reduce the chance of muscosal hemorrhage during nasal intubation.

Side Effects- Although rare, systemic absorption may lead to alpha adrenergic effects such as a transient rise in blood pressure, and/or pulse rate. Caution should be used in patients with a known history of diabetes, and/or hypertension. In addition, it may potentiate the effects of any other prescribed vasopressor agents.

Typical Preparations- 0.5% solution

Dose: Adult: 1metered dose in the affected nostril, wait 30 seconds prior to attempt at nasotracheal intubation. May be repeated once without Base Hospital contact.

PROCAINAMIDE- Antiarrhythmatic- Used in the treatment of ventricular arrhythmias by suppressing the automaticity of ectopic pacemakers, and slows interventricular conduction through the Bundle of His.

Side Effects- Hypotension, nausea, vomiting, confusion and seizures are some side effects. In addition, if hypotension, QRS segment widening by 50% of its original width, or a total dose of 17mg/kg has been given, Procainamide should be discontinued. Patients that present with pre-existing QT prolongation and/or Torsade de Pointes should not receive Procainamide. Use caution in administrating Procainamide to patients who may be experiencing an acute MI, digitalis toxicity or renal failure. Hypotension may be increased if given with other antihypertensive medications, and neurologic toxicity may be increased if administered with Lidocaine.

Typical Preparations-1gm/10ml vial.

Dose: Adult: Stable V-Tach or Wide Complex Tachycardias: Mix 1gm/250ml NS. **Give 20mg (5cc) slowly over 1 minute via IV push.** Repeat until arrhythmia is suppressed **or** to a maximum of 17mg/kg, QRS widens by 50%, or hypotension develops
Maintenance dose: 1-4mg/min if rhythm converts.
Unstable Narrow Complex and Unstable Atrial Fib/Flutter: May consider procainamide at above dosage when other interventions have been unsuccessful.

Pediatric: Not indicated in the pre-hospital setting.

SODIUM BICARBONATE- Alkalizing agent- Combines with strong acids to form a weak volatile acid that degrades to carbon dioxide and water. The end products are removed via the kidneys or lungs. Sodium Bicarbonate is used primarily late in cardiac arrest, after ventilation has been adequately addressed. Sodium Bicarbonate is also used in the treatment of Tricyclic antidepressant overdose.

Side Effects-Can cause metabolic alkalosis following overzealous administration. Do not mix Dopamine with Sodium Bicarbonate. A precipitate is formed in the presence of Calcium Chloride and Sodium Bicarbonate.

Typical Preparations- 50ml syringe (1mEq/1cc)

Dose: Adult: PEA and Asystole: 1mEq/kg IV for patient with known hyperkalemia, overdose of tricyclic antidepressant, or to alkalinize the urine in drug overdoses by Base Hospital Order

Pediatric: Use restricted to direct Base Hospital Physician order *only*.

VERAPAMIL- Slow channel calcium blocker- Slows AV conduction and prolongs the refractoriness of the AV node. Verapamil inhibits dyshrythmias caused by a re-entry mechanism (PSVT). It decreases the rapid ventricular response seen in Atrial Flutter and Atrial Fibrillation, decreases myocardial oxygen demand, and causes coronary artery and peripheral venous vasodilation. However, Verapamil is considered a second line drug to Adenosine in the treatment of narrow-complex tachydysrhythmias.

Side Effects- Systemic hypotension is the main side effect of Verapamil. In addition, it should not be administered to any patient exhibiting symptoms of severe hypotension, cardiogenic shock, pulmonary edema, patients in ventricular tachycardia, receiving intravenous beta blockers, or diagnosed with Wolff-Parkinson-White syndrome.

Typical Preparations- 2ml ampules (2.5mg/ml)

Dose: Adult: Stable Narrow Complex Tachycardias: 5mg IV over 3 minutes

Unstable Atrial Fib/Flutter with narrow complex rhythm: 5mg IV over 3 minutes. May repeat in 15 minutes at 10mg IV over 10 minutes.

Pediatric: Not indicated in pre-hospital setting at this time.

APPROVED: _____

ICEMA Medical Director Date